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CONSULTING MICROPALAEONTOLOGY

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June 19, 1975

TO: Tetra Tech, Inc.

RE: Cape Halkett #1  
N.P.R. #4 U.S.N.  
5, 16N/2W  
North Slope, Alaska

FINAL MICROPALAEONTOLOGY REPORT

Enclosed you will find a 1" to 200' faunal diversity log and three faunal checklists on the U.S.N. Cape Halkett #1 Well. The conclusions presented in this report are based on the processing, picking and examination of 316 ditch samples, generally composited on 30 to 40 foot intervals, and 123 sidewall core samples. Thin sections were prepared on 30 foot ditch intervals and all sidewall core samples below 8760 feet. A generalized age summary of the Cape Halkett #1 Well is provided below.

510-1120'

Generally barren of foraminifera. Coaly cherty sandstone with rare to frequent volcanic glass shards. This unit is probably equivalent lithologically to the Kogosukruk Tongue of the Prince Creek Fm.

AGE: Probable Senonian

1120-2440'

Eoeponidella strombodes (R-F), Anomalinoides pinguis (R), Nonionella cf. taylorensis (R), Praebulimina venusae (R-F), Lacosteina gouskovi (R), Caucasina vitrea (R), Eoeponidella

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1120-2440' (cont'd.)

linki (R), Neobulimina canadensis (R), Vaginulina schraderensis (R), Verneuilinoides fisheri (R), Trochammina ribstonensis (R), T. whittingtoni (R), Cenosphaera spp. (R-C), Sethocyrtis spp. (R-F), Archicorys sp. (R-C), Theocorys sp. (R-F), Dictyomitra multicostata (R-F), Spongodiscus spp. (R-C), Rhopalodictyum sp. (R).

The above assemblage is characteristic of the Senonian Schrader Bluff Formation. Faunas obtained throughout this interval are indicative of oscillating middle to outer shelf (non-turbid) depositional environment.

AGE: Senonian (Schrader Bluff Fm.)

2440-3340'

Saccamina lathrami (R), Trochammina ribstonensis (R-F), Zonodiscus sp. A (R-F), Cenosphaera spp. (R-C), Spongodiscus spp. (R-C), Coal (R-C), Pyrite (R-A).

This interval is generally poor in fauna, but it does contain Zonodiscus sp. A which is considered by Berquist (1966, U.S.G.S. P.P. 302-D p. 182) to be a marker for the Seabee Formation. A top on the "Paper Shale" ("cutinized leaves") was found at 2940 feet, this point is at the top of or down in the Shale Wall Member of the Seabee Formation. This interval is generally dominated by shallow starved basin deposition as indicated by the large amounts of pyrite and coal in these samples, and the lack of preserved calcareous foraminifera associated with the few short pulses of open marine radiolarian bursts.

AGE: Turonian-Cenomanian (Seabee Fm.)

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3340-3640'

Haplophragmoides bonanzaensis (R-C), H. rota (R-F), H. topagorukensis (R), Bathysiphon brosgiei (R), Verneuilinoides borealis (R), Ammobaculites fragmentarius (R), Ditrupa cornu (R).

While the above fauna seems indicative of the Albian, the frequency of occurrences of the Albian forms is rare enough to make one suspicious of reworking. A similar interval occurred in the Fish Creek #1 Well between 2750 feet and 3130 feet.

AGE: Albian (Probable)

3640-5740'

Haplophragmoides topagorukensis (R-A), H. rota (R-F), Ammobaculites fragmentarius (R), A. wenohae (R), Lenticulina macrodisca (R), Trochammina umiatensis (R-C), T. rainwateri (R-F), Miliammina manitobensis (R-F), M. awunensis (R), Bathysiphon brosgiei (R), B. vitta (R), Verneuilinoides borealis (R-C), Psamminopelta bowsheri (R), P. subcircularis (R), Ditrupa cornu (R-F), Oolina apiculata (R-F), Gavelinella stictata (R), Eurycheilostoma grandstandensis (R), Valvulinera loetterlei (R).

The above fauna is typical of the Verneuilinoides borealis Faunal Zone of Albian Age. There is slight evidence in the ditch sample from 4430-4460' for the presence of the Textularia topagorukensis Faunal Subzone which may mark the top of the Torok Formation locally.

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3640-5740' (cont'd.)

The environments represented by these assemblages were probably of middle to outer shelf depths characterized by generally clear waters with only occasional short periods of high turbidity.

AGE: Albian-Aptian

5740-7320'

Interval characterized by occurrence of pyritized radiolaria (R-C), rare agglutinated forms, megaspores (R-F), Coal (R-C), and Pyrite (F-FL).

Deposition of these strata probably took place in depths varying from marginal marine to middle shelf, and uniformly characterized by reducing (oxygen deficient) bottom conditions. This especially holds true for the lower 600 feet of this interval where high organic concentration ("paper shale") suggests a paucity of available clastic detritus and probably highly reducing bottom conditions.

The lack of any fauna suggestive of the Gaudryina tailleuri Zone provides some negative evidence that this interval is still Aptian to possibly Albian Age. In fact, this poorly fossiliferous pyritized facies could be older Cretaceous.

AGE: Aptian to Albian ?

7320-7510'

Rounded frosted quartz floaters (F-C), Lithocampe sp. "N" (R), Trochammina canningensis (R), Gaudryina cf. milleri (R), G. topagorukensis (R), G. tailleuri (R-F), Conorboides "J" (R), Pseudobolivina sp. (R-F).

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7320-7510' (cont'd.)

This fauna is indicative of a Latest Jurassic to Earliest Cretaceous (Berriasian) Age. The first evidence for "Pebble Shale" appears in the samples at 7320' (D) and 7326' (SWC).

This assemblage suggests a depositional environment of outer neritic to possibly as deep as upper bathyal turbid waters.

AGE: Latest Jurassic to Earliest  
Cretaceous (Berriasian)

7510-7630'

A basal sandstone unit occurs between 7530 feet and 7545 feet that is similar in appearance to the Sag River Ss., but whether the unconformity lies above or below this unit cannot be precisely established since the unit is faunally depauperate.

7630-8160'

*Astocolus connudatus* (R-F), *Trochamminoides cf. vertens* (R), *Fronicularia lustrata* (R), *Marginulina cf. prima* (R), *Nodosaria pachistika* (R), *N. phobytica* (R), *N. shublikensis* (R), *Tolypammina glareosa* (R), *Monotis* sp. (R-F).

The above listed species are characteristic of Triassic Age. This faunule is probably representative of a relatively clear water middle neritic to upper bathyal environment. The lithologic top of the Shublik Fm. occurs at around 7850 feet suggesting that there may be some Triassic age Kingak Shale (lithologically) or else some different facies (lithologically different) Shublik Fm. or Sag River equivalents occurring between 7630 feet and 7850 feet.

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8160-8820'

This interval is generally barren of foraminifera suggesting that it represents either nonmarine deposition or else the results of dilution of the faunas by an increased rate of sedimentation. Lithologically, this interval is similar to the Sadlerochit Formation of Permian Age to Triassic Age. Samples between 8160 feet and 8790 feet lithologically represent the Ivishak Member while samples between 8790 feet and 8820 feet suggest the presence of a thin interval of the Echooka Member.

AGE: Probable Permian-Triassic

8820-9160' (?)

This interval is characterized by occurrences of Globivalvulina bulloides, Biseriella parva, Monotaxinoides multivolutus, Ammovertella sp., Trepeilopsis sp., Earlandia elegans, Pseudoglomospira sp., Asteroarchaediscus sp., Neoarchaediscus incertus, Endothyra sp., Eostaffella radiata?, Priscella prisca, Planospirodiscus taimyricus?, Planoendothyra rotayi, Millerella carbonica, Zellerina sp.

The above species are indicative of the Early to Middle Pennsylvanian Wahoo Limestone in Alaska. These species represent Zones 20 and 21 in Mamet's zonal scheme for the Carboniferous. It appears that based on a decrease in frequency of Globivalvulina bulloides and an increase in the frequency of Biseriella parva and Priscella prisca a Zone 20-Zone 21 boundary may be placed at around 9020 feet.

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8820-9160' (?) (contd)

The Mississippian-Pennsylvanian boundary is hard to place, even in core material, but the first indications for Mississippian Age occur at 9230 feet. The contact may be as high as 9160 feet where it appears on the accompanying faunal log.

AGE: Early to Middle Pennsylvanian

9160(?) - 9779'

The placing of the upper boundary of this interval was discussed above. The co-occurrence of Cribrostomum bradyi and Biseriella parva in the same fragment at 9230 feet suggests that these strata are Zone 18 in age (Upper Mississippian). The co-occurrence of Earlandinella sp., Neoarchaediscus incertus and Asteroarchaediscus sp. indicate Zone 16s or Zone 17 age (Upper Mississippian) for the strata at 9390 feet. The above age calls were difficult to recognize due to an abundant amount of caved Zone 20 and Zone 21 limestone fragments in the ditch material. There were rare occurrences as high as 9570 feet of forms indicative of Zone 13, but again due to the large amount of cavings, and questionable taxonomic assignments of rare, poorly oriented specimens, the Zone 13 calls may not prove to be very reliable. The lithology changed at 9320 feet to a greenish gray and gray shale. This is probably the Kayak Shale.

AGE: Upper Mississippian

9779-9900' T.D.

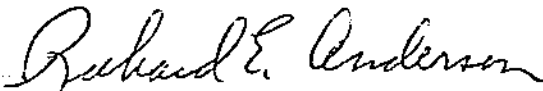
Thin sections from sidewall cores at 9779 feet and 9858 feet exhibit good lineations and secondary growth of mica along planar surfaces indicating the weak metamorphism of a shale or

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9779-9900' T.D. (cont'd.)

mudstone to an argillite. The sidewall core from 9890 feet appears to be a black strongly lineated argillite or slate. The exact age of this unit is unknown; no foraminifera were recovered in this interval.

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Richard E. Anderson